



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,269	03/21/2005	Yasuaki Nakano	123106	2942
25944 7590 08/05/2008 OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850				
EXAMINER				
TRAN, DIEM T				
ART UNIT		PAPER NUMBER		
3748				
MAIL DATE		DELIVERY MODE		
08/05/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/527,269

Applicant(s)

NAKANO ET AL.

Examiner

DIEM TRAN

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-15 and 38-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-15 and 38-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date 4/5/05, 10/21/05, 6/11/07
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This office action is in response to the Applicant's election filed on 4/29/08. Applicant's election with traverse of species of Figure 1 in the reply filed on 4/29/08 is acknowledged. Claims 1, 2, 4-15, 38-40 are readable thereon will be examined in its full merit. Claims 3, 16-37 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a non-elected invention.

The traversal is on the ground(s) that a search and examination of the entire application could be performed without serious burden. This is not found persuasive because the subject matter of all species of claimed inventions are clearly not related in terms of different functions. For example, in the elected species of Figure 1, the claimed invention is directed to a single exhaust purification device for an internal combustion engine. On the other hand, in the species of Figures 16, 17, 21, 38, there is an additional NOx selective reducing catalyst in the exhaust system that is not included in the species of Figure 1. In the species of Figure 18, there is fuel injection into the exhaust gas between two catalysts that is not included in Figure 1. In the species of Figure 36, there is a third oxidation catalyst (70) in the same housing with NOx storing catalyst that is not included in Figure 1. In the species of Figure 39, there is a NOx storing catalyst between two NOx purification catalysts. And in the species of Figure 40, there are two NOx storing catalysts between two NOx purification catalysts in the exhaust gas system. The clear unrelated features among the groups of claimed invention would require a separate search area for each species and thus, impose a burden in search and examination. The requirement is still deemed proper and is therefore made FINAL.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claims 1, 2, 4, 7, 8, 10-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Kihara et al. (US Patent 5,577,382).***

Regarding claims 1, 2, 4, Kihara discloses an exhaust purification device for an internal combustion engine designed to purify NO<sub>x</sub> generated when burning fuel under a lean air-fuel ratio by an exhaust purification catalyst arranged in an exhaust passage, said exhaust purification device using as a catalyst carrier of said exhaust purification catalyst a carrier having base points on the carrier surface, carrying a precious metal catalyst dispersed on the carrier surface without forming a layer of a NO<sub>x</sub> absorbent able to absorb NO<sub>x</sub>, and temporarily switching the air-fuel ratio of the exhaust gas flowing into the exhaust purification catalyst from lean to rich before the entire surface of the precious metal catalyst suffers from oxygen poisoning (see Figures 1, 5A, 5B, col. 5, lines 1-4, 35-42, col. 13, lines 34-51).

Regarding claims 7, 8, 10, Kihara further discloses calculating an amount of oxygen poisoning of the precious metal catalyst and wherein the air-fuel ratio of the exhaust gas is switched from lean to rich when the calculated amount of oxygen poisoning exceeds a predetermined allowable value (see col. 13, lines 35+, col. 14, lines 1+).

Regarding claim 11, Kihara further discloses that an air-fuel ratio sensor (22) is used for detecting an air-fuel ratio of the exhaust gas flowing out from the exhaust purification catalyst

and wherein it is judged that oxygen poisoning of the precious metal catalyst has been eliminated, when the air-fuel ratio of the exhaust gas flowing out from the exhaust purification catalyst becomes rich after the air-fuel ratio of the exhaust gas flowing into the exhaust purification catalyst is switched from lean to rich (see Figure 17, col. 13, lines 34-50).

Regarding claim 12, Kihara further discloses that the NO<sub>x</sub> and SO<sub>x</sub> contained in the exhaust gas are oxidized by the precious metal catalyst in the exhaust purification catalyst, then held on the catalyst carrier (see col. 7, lines 45-62).

Regarding claim 13, Kihara further discloses that the NO<sub>x</sub> held on the catalyst carrier is released from the catalyst carrier and reduced when the air-fuel ratio of the exhaust gas flowing into the exhaust purification catalyst is temporarily switched from lean to rich to eliminate the oxygen poisoning of the precious metal catalyst (see col. 6, lines 1-21).

Regarding claim 14, Kihara further discloses that the strength of the basicity of the surface of the catalyst carrier is set to a strength by which the SO<sub>x</sub> is held on the surface of the catalyst carrier in the form of sulfate ions (see col. 7, lines 45-62).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

***Claims 5, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al. (US Patent 5,577,382) in view of Yamashita et al. (US Patent 6,148,612).***

Regarding claim 5, Kihara discloses all the claimed limitations as discussed in claim 1 above, however, fails to disclose that the ratio of a rich time to a lean time at this time is set to a ratio giving a NOx purification rate of 90 % or more when the temperature of the exhaust purification catalyst is 200°C to 250°C. Yamashita teaches that a ratio of a rich time to a lean time at this time is set to a ratio giving a NOx purification rate of 90 % or more when the exhaust purification catalyst is activated (see col. 5, lines 56-67, col. 6, lines 1-11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have utilized the teachings of Yamashita in the Kihara system, since the use thereof would have been conventional in the art to maintain the NOx purification rate at a predetermined level.

Regarding claim 9, Kihara discloses all the claimed limitations as discussed in claim 8 above, however, fails to disclose that a NOx concentration sensor is used for detecting the concentration of NOx in exhaust gas and it is judged that the amount of oxygen poisoning of the precious metal catalyst has exceeded the allowable value when the concentration of NOx detected by the NOx concentration sensor has exceeded a set value. Yamashita teaches that a NOx concentration sensor (41) is used for detecting the concentration of NOx in exhaust gas flowing out from the exhaust purification catalyst and wherein it is judged that the amount of oxygen poisoning of the precious metal catalyst has exceeded the allowable value when the concentration of NOx detected by the NOx concentration sensor has exceeded a set value (see col. 9, lines 30-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have utilized the teachings of Yamashita in the Kihara system, since the use thereof would have been conventional in the art.

*Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al. (US Patent 5,577,382) in view of Nishikawa et al. (US Patent 5,315,823).*

Kihara discloses all the claimed limitations as discussed in claim 1 above, however, fails to disclose that the action of switching the air-fuel ratio from lean to rich is prohibited when the temperature of the exhaust purification catalyst is an allowable temperature or more. Nishikawa teaches the action of switching the air-fuel ratio from lean to rich is allowed when the temperature of the exhaust purification catalyst is less than allowable temperature (see col. 3, lines 30-34, col. 4, lines 26-31)

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have utilized the teachings of Nishikawa in the Kihara system, since the use thereof would have increased the efficiency of the NOx purification catalyst.

*Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al. (US Patent 5,577,382) in view of Miyoshi et al. (US Patent 6,562,753).*

Kihara discloses all the claimed limitations as discussed in claim 14 above, Kihara further discloses that when getting the SOx held on the surface of the catalyst carrier released from the surface of the catalyst carrier, then the air-fuel ratio of the exhaust gas is made rich (see col. 7, lines 63-67, col. 10, lines 53-62); however, fails to disclose that the temperature of the exhaust

Art Unit: 3748

purification catalyst is made to rise to the SO<sub>x</sub> release temperature and the SO<sub>x</sub> release temperature is about 500°C to 550°C. Miyoshi teaches increasing the exhaust temperature to a SO<sub>x</sub> release temperature and the SO<sub>x</sub> release temperature is about 500°C to 550°C (see col. 7, lines 62-67, col. 10, lines 50-65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have utilized the teachings of Miyoshi in the Kihara system, since the use thereof would have been conventional in the art to regenerate the exhaust purification catalyst.

***Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al. (US Patent 5,577,382).***

Kihara discloses all the claimed limitations as discussed in claim 1 above, however, fails to disclose that a reducing agent is fed into the engine exhaust passage to make the air-fuel ratio of the exhaust gas rich.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to inject a reducing agent into an engine exhaust passage in Kihara, since the examiner takes Official Notice of the equivalence of “injecting fuel into a cylinder” and “injecting fuel into an exhaust passage” to form a rich gas stream for their use in the exhaust gas treatment art, and the selection of any of these known equivalents would be within the level of ordinary skill in the art.

***Claims 39, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al. (US Patent 5,577,382) in view of Yoshizaki et al. (US Patent 6,634,345).***



Regarding claim 39, Kihara discloses all the claimed limitations as discussed in claim 1 above, however, fails to disclose gradually increasing in amount of generation of soot and reaching a peak when increasing the amount of exhaust gas recirculation and no longer generating almost any soot when further increasing the amount of exhaust gas recirculation and wherein the air-fuel ratio of the exhaust gas is made rich where the amount of exhaust gas recirculation being increased over the amount where the amount of generation of soot peaks. Yoshizaki teaches increasing gradually in amount of generation of soot and reaches a peak when increasing the amount of exhaust gas recirculation and no longer generates almost any soot when further increasing the amount of exhaust gas recirculation and wherein the air-fuel ratio of the exhaust gas is made rich where the amount of exhaust gas recirculation being increased over the amount where the amount of generation of soot peaks (see col. 2, lines 40-51).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have utilized the teachings of Yoshizaki in the Kihara system, since the use thereof would have suppressed the reduction in the exhaust gas temperature.

Regarding claim 40, Yoshizaki further discloses gradually increasing in amount of generation of soot and reaches a peak when increasing the amount of exhaust gas recirculation and no longer generates almost any soot when further increasing the amount of exhaust gas recirculation and wherein the amount of exhaust gas recirculation is increased over the amount where the amount of generation of soot peaks when the temperature of the exhaust purification catalyst should be raised (see col. 2, lines 40-64).

### ***Conclusion***

Any inquiry concerning this communication from the examiner should be directed to Examiner Diem Tran whose telephone number is (571) 272-4866. The examiner can normally be reached on Monday -Friday from 8:00 a.m.- 6:00p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reached on (571) 272-4859. The fax number for this group is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 800-786-9199 (toll-free).

/Thomas E. Denion/  
Supervisory Patent Examiner, Art Unit 3748

/Diem Tran/  
Patent Examiner